

Review of Artificial Intelligence Techniques in Imaging Data Acquisition, Segmentation, and Diagnosis for COVID-19

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Abstract

The pandemic of coronavirus disease 2019 (COVID-19) is spreading all over the world. Medical imaging such as X-ray and computed tomography (CT) plays an essential role in the global fight against COVID-19, whereas the recently emerging artificial intelligence (AI) technologies further strengthen the power of the imaging tools and help medical specialists. We hereby review the rapid responses in the community of medical imaging (empowered by AI) toward COVID-19. For example, AI-empowered image acquisition can significantly help automate the scanning procedure and also reshape the workflow with minimal contact to patients, providing the best protection to the imaging technicians. Also, AI can improve work efficiency by accurate delineation of infections in X-ray and CT images, facilitating subsequent quantification. Moreover, the computer-aided platforms help radiologists make clinical decisions, i.e., for disease diagnosis, tracking, and prognosis. In this review paper, we thus cover the entire pipeline of medical imaging and analysis techniques involved with COVID-19, including image acquisition, segmentation, diagnosis, and follow-up. We particularly focus on the integration of AI with X-ray and CT, both of which are widely used in the frontline hospitals, in order to depict the latest progress of medical imaging and radiology fighting against COVID-19.